Welcome !
Quick Overview
2016 Spring Inspector Updates
Fire Rated Assy's;
Door & Duct Penetrations

Presented by
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Department of Safety & Professional Services
Division of Industry Services

Web Site:
DSPS.WI.GOV

2009 IBC with SPS Chapter 362

- A Partnership between Designers, Builders, Owners, and Code Officials

International Building Code (IBC) Table of Contents

- Ch. 1 Administration
- Ch. 2 Definitions
- Ch. 3 Use and Occupancy Classification
- Ch. 4 Special Detailed Req'ts Based on Use & Occupancy
- Ch. 5 General Buildng Heights and Areas
- Ch. 6 Duct Systems
- ***Ch. 7 Fire & Smoke Features (Primary Reference)***
- Ch. 8 Chimneys and Vents, etc.

2009 IMC with SPS Chapter 364

A Partnership between Designers, Builders, Owners, and Code Officials

International Mechanical Code (IMC) Table of Contents

- Ch. 1 Administration
- Ch. 2 Definitions
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- Ch. 5 Exhaust Systems
- ***Ch. 6 Duct Systems (Secondary Reference for Fire & Smoke Dampers)***
- Ch. 7 Combustion Air
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International Mechanical Code (IMC) Table of Contents (cont'd)

- Ch. 9 Specific Appliances/Fireplaces & Solid Fuel Burning Equipment
- Ch. 10 Boilers, Water Heaters & Pressure Vessels (NA-See SPS 341)
- Ch. 11 Refrigeration (NA-See SPS 345)
- Ch. 12 Hydronic Piping
- Ch. 13 Fuel Oil Piping & Storage
- Ch. 14 Solar Systems (See also SPS 371)

Fire Resistive Marking & Identification IBC 703.6

- Fire walls, fire barriers, fire partitions, smoke barriers & smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling.

Fire Resistive Marking & Identification IBC 703.6

- Such identification shall:
  - Be located in accessible concealed floor, floor-ceiling or attic spaces
  - Be repeated at intervals not exceeding *30 ft* measured horizontally along with wall or partition, AND
  - Include lettering *not less than 0.5 inch* in height, incorporating the suggested wording:

FIRE AND/OR SMOKE BARRIER

PROTECT ALL OPENINGS

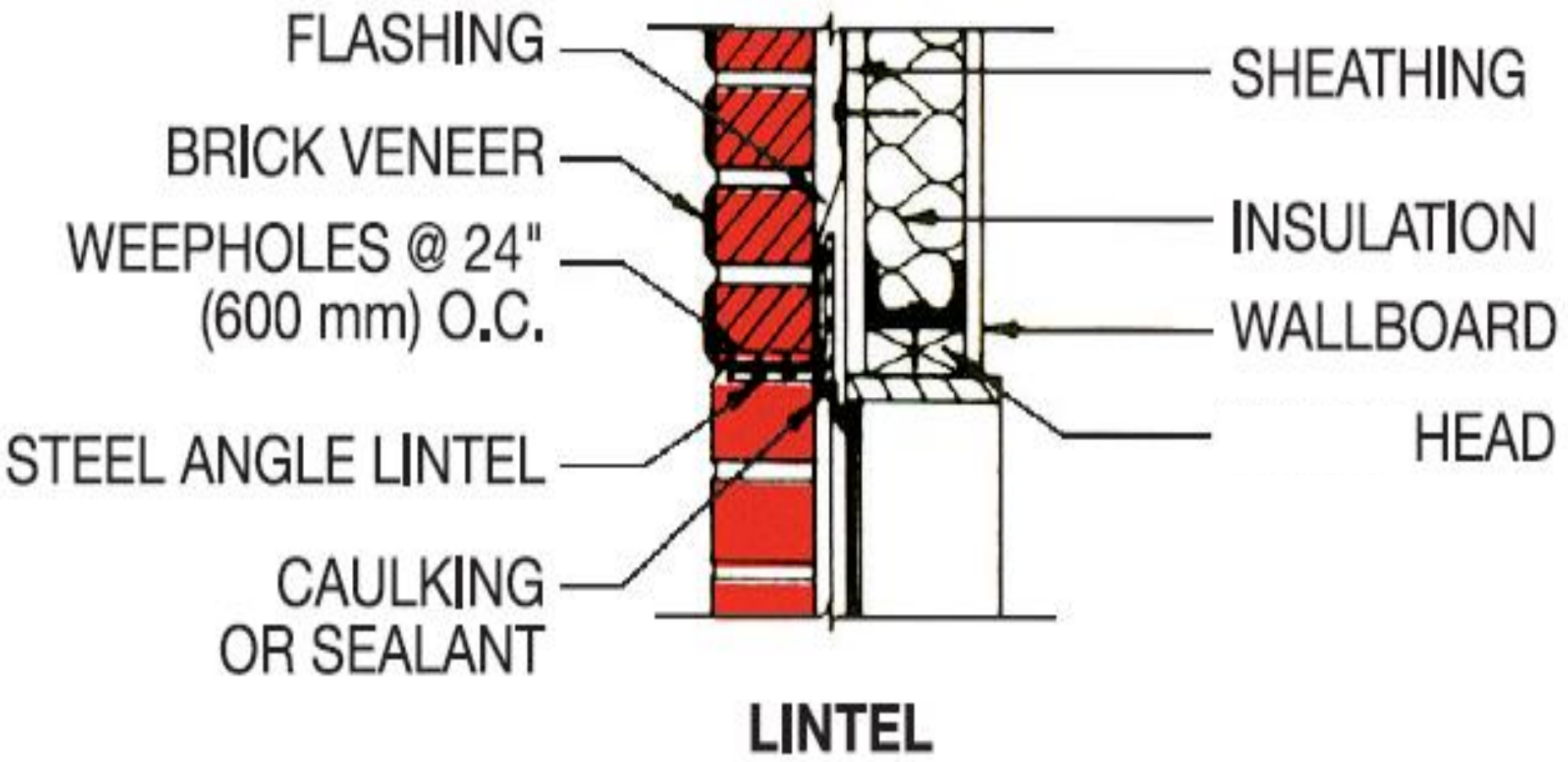
Fire Resistive Marking & Identification IBC 703.6

- Identification exception:
  - Walls in Group R-2 occupancies that do NOT have a removable decorative ceiling allowing access to the concealed space.

Bottom Flange Protection

IBC 704.11

- Structural frame elements located over an opening in a wall required to be fire rated are addressed by this section.
  - The bottom flanges of lintels or angles $\leq$ 6 ft in length are not required to be protected even if part of the primary structural frame.


FLASHING
BRICK VENEER
WEEPHOLES @ 24"
(600 mm) O.C.
STEEL ANGLE LINTEL
CAULKING
OR SEALANT
SHEATHING
INSULATION
WALLBOARD
HEAD

LINTEL

Shaft Enclosure Fire Resistance Rating IBC 708.4

- Shaft Enclosure Requirements:
  - When connecting < 3 stories; not less than *1 hr*
  - When connecting ≥ 4 stories; not less than *2 hrs*

Opening Protectives
IBC 715.1

- Opening protectives required by other sections of this code shall comply with the provisions of this section.

Fire Door & Shutter Assemblies IMC 715.4

- Approved fire door & fire shutter assemblies shall be constructed of any material or assembly of component materials that conforms to the test requirements of Section 715.4.1, 715.4.2 or 715.4.3

Fire Door & Shutter Assemblies IMC 715.4

- and the fire protection rating indicated in Table 715.4. Fire door assemblies & shutters shall be installed in accordance with the provisions of this section and NFPA 80.

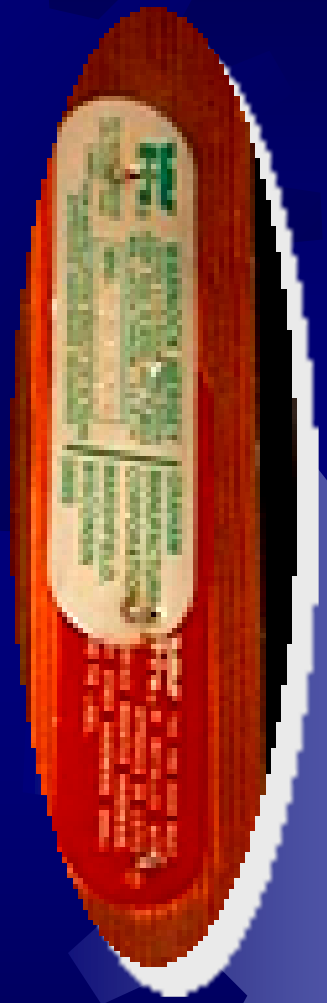


TABLE 715.4

OPENING PROTECTIVE FIRE PROTECTION RATING

Type of Assembly	Required Assembly Rating (hour)	Minimum Opening Protection Assembly (hour)
Fire walls and fire barriers having a req'd fire resistance rating greater than *1 hour*	4	3
	3	3[a]
	2	1 1/2
	1 1/2	1 1/2
Fire barriers of *1 hour* fire resistance rated construction :		
Shaft & exit enclosure/passageway walls	1	1
Other fire barriers	1	3/4

TABLE 715.4 (Cont.)
OPENING PROTECTIVE FIRE PROTECTION RATING

Type of Assembly	Required Assembly Rating (hour)	Minimum Opening Protection Assembly (hour)
Fire partitions:		
Corridor Walls	1	1/3[b]
	0.5	1/3[b]
Other fire partitions	1	3/4
	0.5	1/3
Exterior walls	3	1-1/2
	2	1-1/2
	1	3/4
Smoke barriers	1	1/3[b]

Fire Door & Shutter Assemblies IMC 715.4

Note a. Two doors, each with a fire protection rating of *1-1/2 hrs*, installed on opposite sides of the same opening in a fire wall, shall be deemed equivalent in fire protection rating to one *3–hr* fire door.

Note b. For testing requirements, see Section 715.4.3.

Fire Door & Shutter Assemblies IMC 715.4

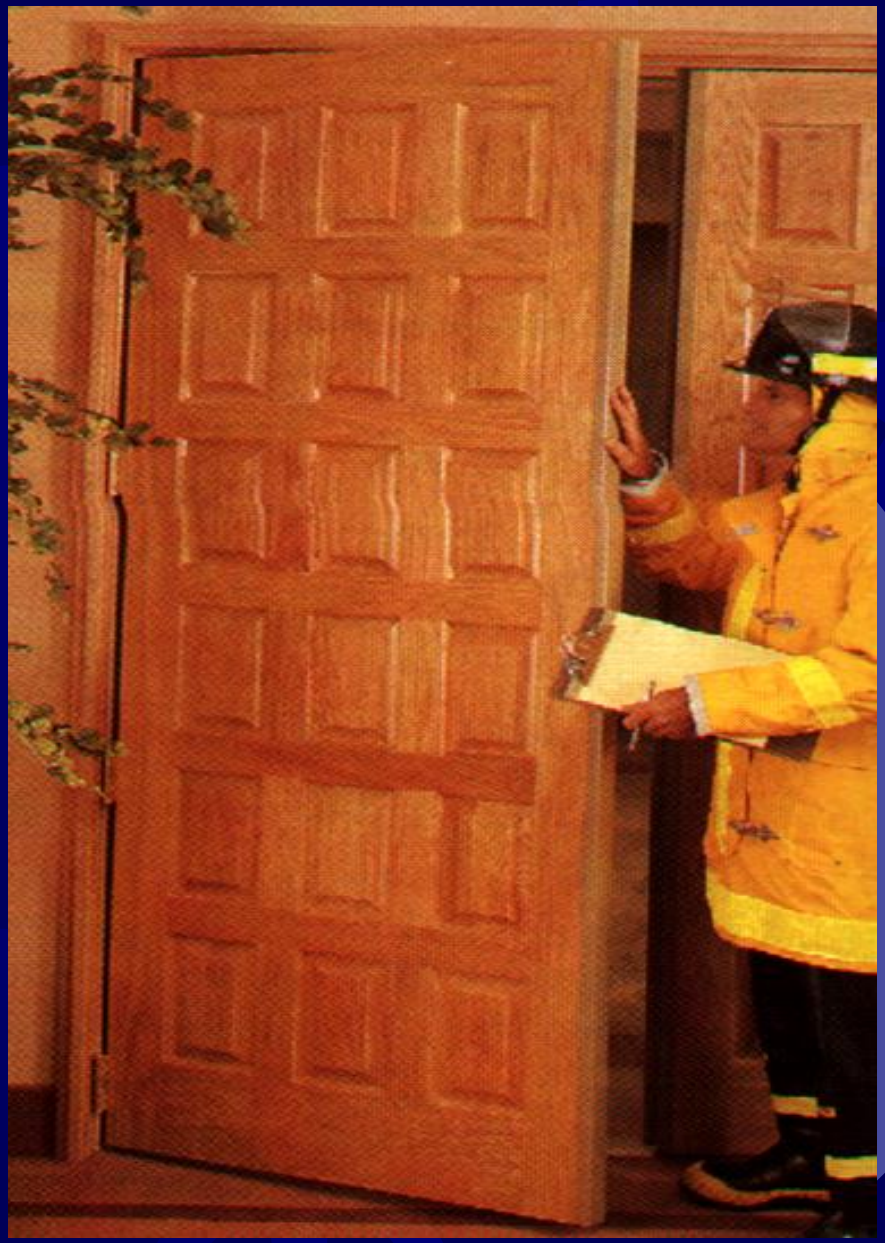
- Exceptions
  - 1. Labeled protective assemblies that conform to the requirements of this section or UL 10A, 14B & 14C for tin-clad fire door assemblies.
  - 2. Floor fire doors shall comply with Section 712.8.

Fire Door & Shutter Assemblies IMC 715.4.3

- Fire door assemblies required to have a minimum fire protection rating of 20 minutes where located in corridor walls or smoke barrier walls having a fire resistance rating in accordance with Table 715.4 shall be tested in accordance with NFPA 252 or UL 10C without the hose stream team
  - Exceptions.

20 Minute Rated Fire Door Assembly

Required when located in fire rated corridor walls, or smoke barrier walls with a 1 hr rating



Labeled Protective Assemblies

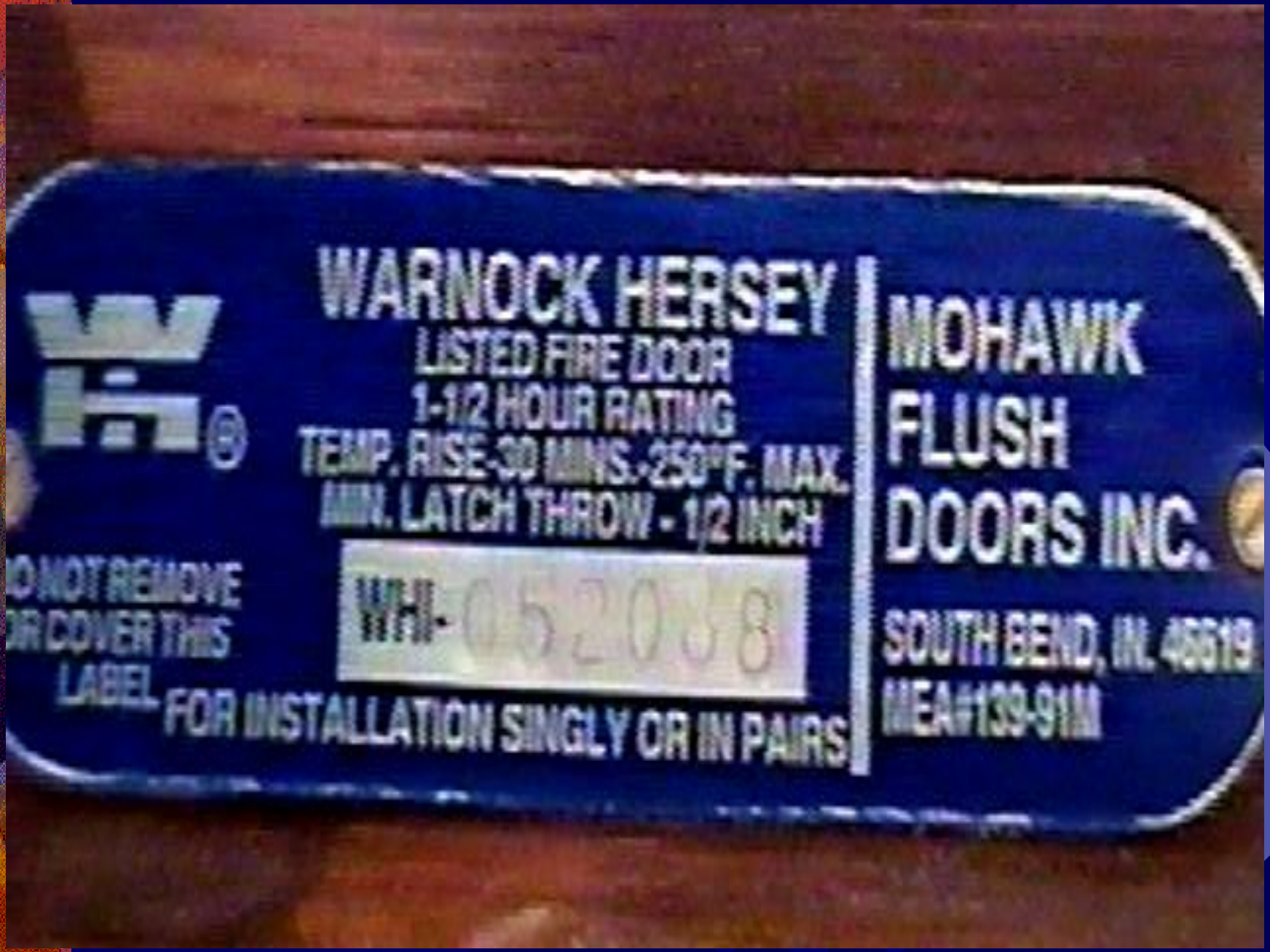
IMC 715.4.6

- Fire door assemblies shall be *labeled by an approved agency*
- *Must show name of manufacturer* or other identification traceable back to manufacturer, name or trademark of 3rd party inspection agency, *the fire protection rating* and where required for fire doors in exit enclosures and exit passageways by Section 715.4.4, *the maximum transmitted temperature end point*.

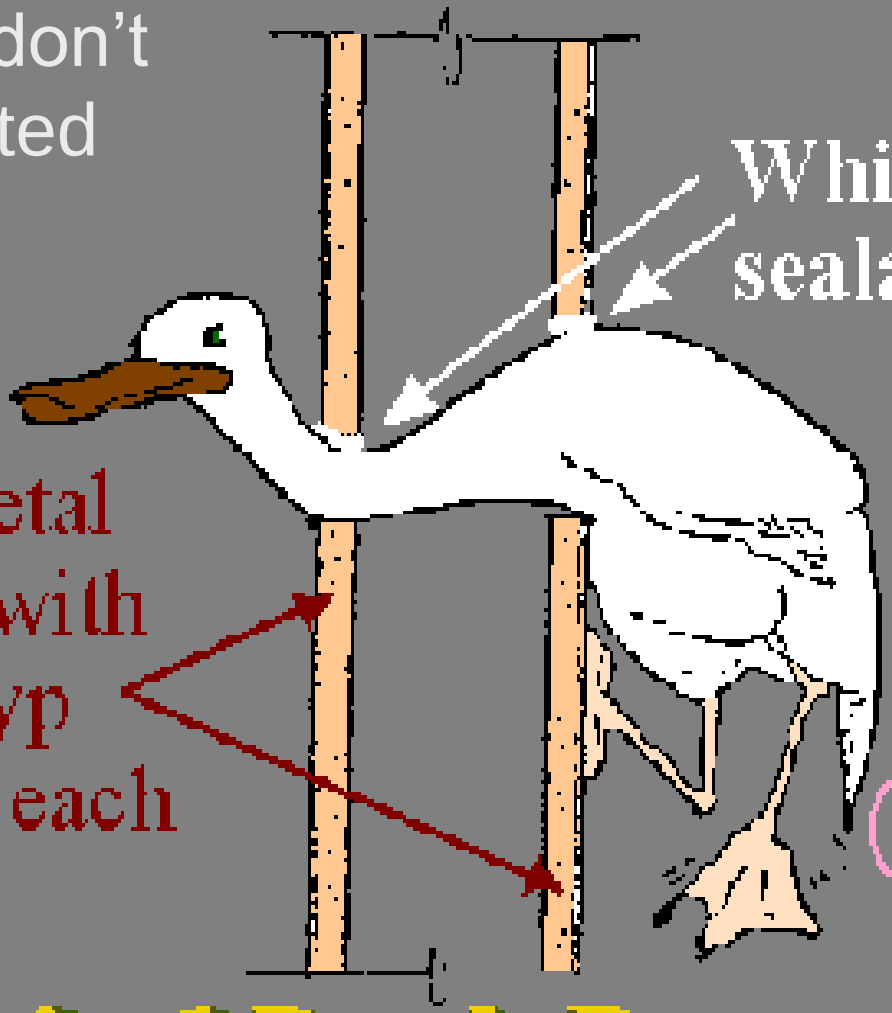
Fire Door Closers

IBC 715.4.8

- *Fire doors shall be self-or automatic-closing* in accordance with this section:
- Exceptions:
  - Fire doors in common walls separating sleeping units in Group R-1 are exempt
  - Elevator car doors & hoistway enclosure doors at the floor level designated for recall in accordance with IBC 3003.2 shall be permitted to remain open during Phase I emergency recall operations.


WARNOCK HERSEY
LISTED FIRE DOOR
1-1/2 HOUR RATING
TEMP. RISE-30 MINS.-250°F. MAX.
MIN. LATCH THROW - 1/2 INCH
WHI-052038
DO NOT REMOVE
OR COVER THIS
LABEL
FOR INSTALLATION SINGLY OR IN PAIRS
MOHAWK
FLUSH
DOORS INC.
SOUTH BEND, IN. 46619
MEA#139-91M

Make sure openings don't exceed listed opening allowance



White silicone sealant to match ductwork

3½ metal studs with 5/8 Gyp board each side

Duck (Typical)

Typical Duck Penetration at Rated Partition

Duct & Transfer Openings

IBC 716 & IMC 607.5

- Fire dampers, smoke dampers & combination fire/smoke dampers shall be provided at the locations prescribed in Sections 607.5.1 through 607.5.7
- Where an assembly is required to have both fire dampers & smoke dampers, combination fire/smoke dampers or a fire damper and smoke damper shall be required.

Fire Damper Requirements

IMC 607.3.1 & Table 607.3.2.1

- Must meet listing requirements of *UL 555*
- Must have a minimum fire rating as listed below.

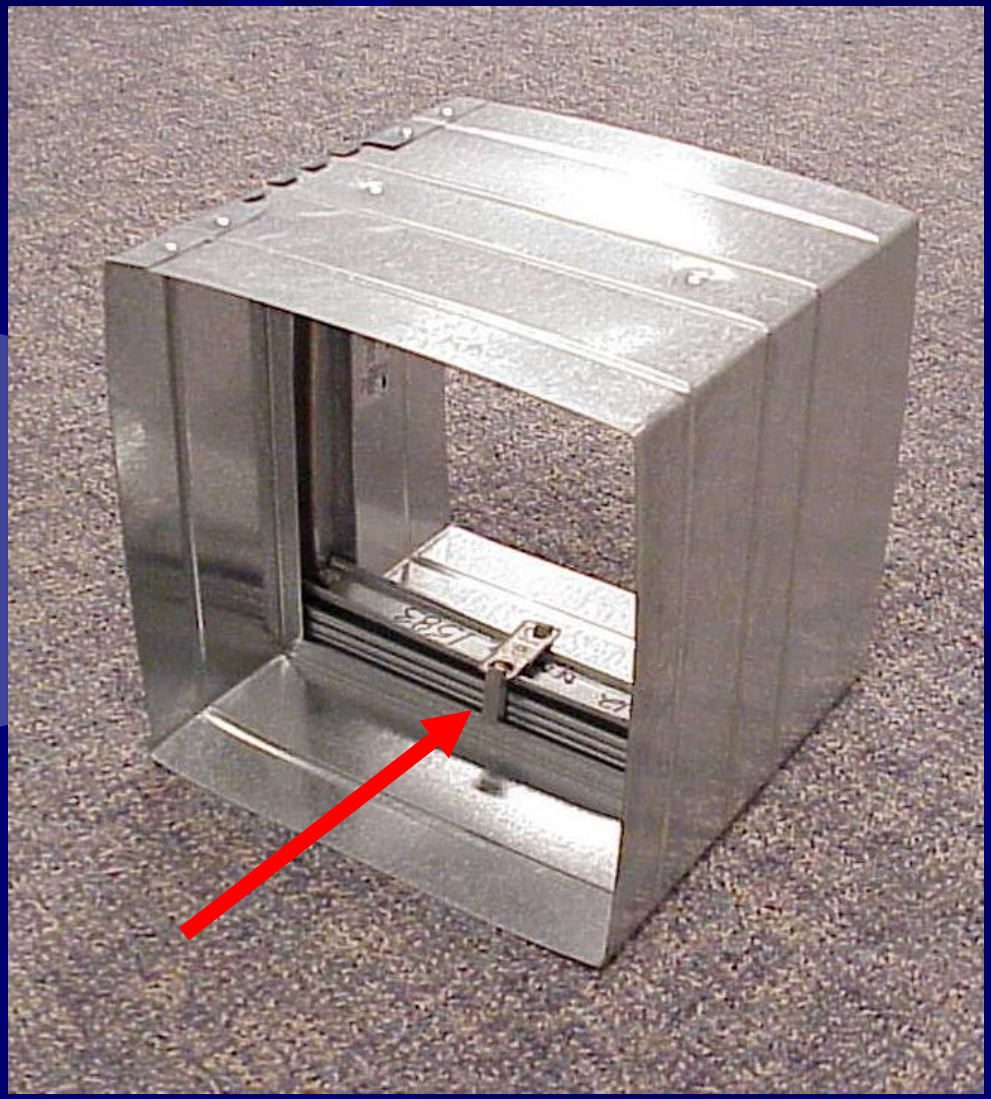
Type of Penetration	Min. Damper Rating (hr)
< 3 hr fire resistance-rated assemblies	1.5
≥ 3 hr fire resistance-rated assemblies	3

Fire Damper Requirements

IMC 607.3.1 & Table 607.3.2.1

- Question: At what locations can an individual install listed *45 minute fire dampers* in a commercial building?

Typical Label Identifying Testing Criteria & Installation information



Fire Damper with metal melting lock used for activation

Fire Damper Activation

IMC 607.3.3.1

- Fire damper activation to meet one of the following requirements:
  - Operating temperature to be $\geq$ 50°F above the normal temperature within the duct system but $\geq$ 160°F
  - The operating temperature limit of 350°F where located in a smoke control system complying IBC 909

Fire Damper Requirements

IMC 607.3.3.1

- Inspector to make the call:
  - Fire dampers were not properly covered when the room was spray painted. The melting tabs on the dampers:
    - Received a few dots of paint
    - Were completely covered with paint

Does the inspector

A) Do nothing

B) Ask that paint thinner be used to clean the tabs

C) Require that all tabs be replaced.

Smoke Damper Requirements & Activation IMC 607.3.1 & 607.3.3.2

- Must meet listing requirements *UL 555**S*** for Smoke Dampers

- Smoke dampers shall close upon activation of a listed smoke detector installed per IBC 907.3 (NFPA 72), and 1 of the following:

Smoke Damper Activation
IMC 607.3.3.2

- 1) Where a smoke damper is installed within a duct, a smoke detector is to be installed within *5 ft* of the damper with no air outlets or inlets between the detector & the damper.

Smoke Damper Activation

IMC 607.3.3.2

- 1) (cont.) The detector to be listed for air velocity, temperature & humidity anticipated at the point where it is installed...

Smoke Damper Activation
IMC 607.3.3.2

- 2) Where a smoke damper is installed above smoke barrier doors in a smoke barrier, a spot type detector listed for releasing service shall be installed on either side of the smoke barrier door openings.

Smoke Damper Activation

IMC 607.3.3.2

- 3) Where a smoke damper is installed within an unducted opening in a wall (ie a transfer grille), a spot type detector listed for releasing service shall be installed within *5 ft* horizontally of the damper.

Smoke Damper Activation

IMC 607.3.3.2 (See also IMC 607.5.4)

- 4) Where a smoke damper is installed in a corridor wall or ceiling, the damper shall be permitted to be controlled by a smoke detection system installed in the corridor
  - Note: In this case, the detector is not required to be located within the duct.

Smoke Damper Activation

IMC 607.3.3.2

- 5) Where a total coverage smoke detector system is provided within areas served by a *HVAC system*, smoke dampers shall be permitted to be controlled by the smoke detection system

  - Note that installation of smoke detectors in R2 apartments in compliance with IBC 907.2.11 is **NOT** considered a total coverage smoke detector system. Such a system must cover the **ENTIRE** building and not just sleeping areas, etc.

Combination Fire/Smoke Damper Requirements

IMC 607.3.2.3 & 607.3.3

- Require minimum fire rating per IMC Table 607.3.2.1. Combination fire/smoke dampers shall have a min. Class II leakage rating & a min. elevated temperature rating of 250°F
- Smoke dampers required at duct/transfer penetrations in a fire wall or fire barrier that serves as a horizontal exit

- **Required for <u>Shaft Enclosures</u>**
  - **Enclosed space extending through one or more stories of a bldg connecting openings in successive floors or floors & roof**
- Required for fire rated corridor enclosures per IMC 607.5.4 & 607.5.4.1; and smoke barriers per 607.5.4

Fire/Smoke Damper with actuator on side for activation
See IMC 607.3.3 for acceptable activation methods

Combination Fire/Smoke Damper Activation IMC 607.3.3.4

- Combination assys to meet the activation requirements for both a fire damper and a smoke damper.
- Combination fire/smoke dampers installed in smoke control system shaft penetrations shall not be activated by local area smoke detection unless it is secondary to the smoke management system controls

Access & Identification

IMC 607.4

- Fire & smoke dampers shall be provided with an approved means of access, large enough to permit inspection and maintenance of the damper and its operating parts.

Ceiling Radiation Damper Requirements & Activation

IMC 607.3.1 & 607.3.3.4

- Must meet listing requirements *UL 555**C*** for Ceiling Radiation Dampers

- The operating temperature of ceiling radiation damper actuation device shall be 50°F above the normal temperature within the duct system, but not less than 160°F

Fire & Smoke Damper Access & Identification IMC 607.4

- Access points shall be permanently identified on the exterior by a label having letters not less than *0.5”* in height reading:

FIRE/SMOKE DAMPER

FIRE DAMPER

SMOKE DAMPER

…The access shall not affect the integrity of fire resistance rated assemblies. The access openings shall not reduce the fire resistance rating of the assembly…….

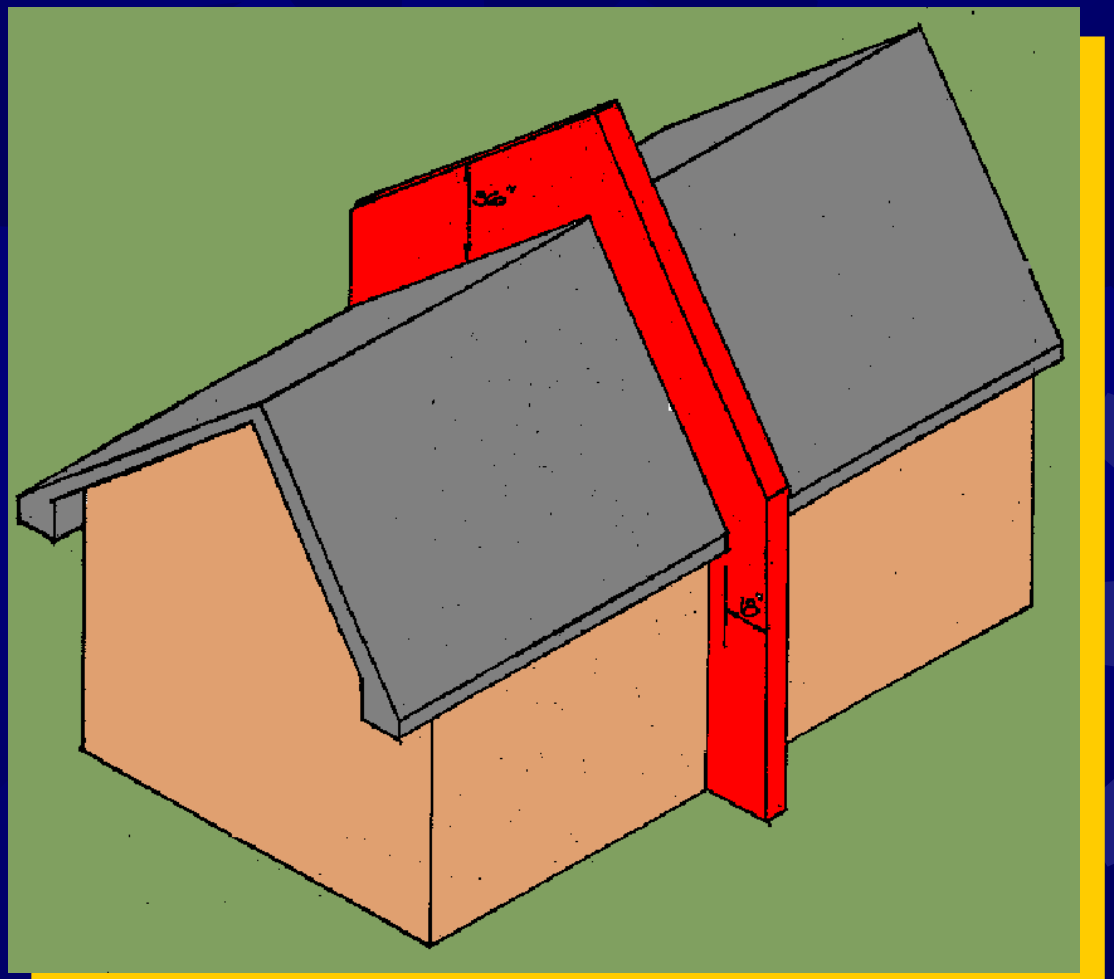
Fire Wall - Fire Dampers
IMC 607.5.1, IBC 706.1 & 706.11

- **No Fire Dampers Allowed in a:**
  - **Party Wall** - A Fire Wall located on property line
    - **NO** OPENINGS ALLOWED
    - **NO** PENETRATIONS
    - **NO** FIRE DAMPERS
    - ***NOTHING!!!!!!!***

Fire Wall - Fire Dampers
IMC 607.5.1, IBC 702, 706.6, 706.11

- May be Required for:
  - **Fire Walls**--Extend continuously from foundation to/through roof with stability to allow collapse of construction on either side without collapse of the wall

What do fire walls create?

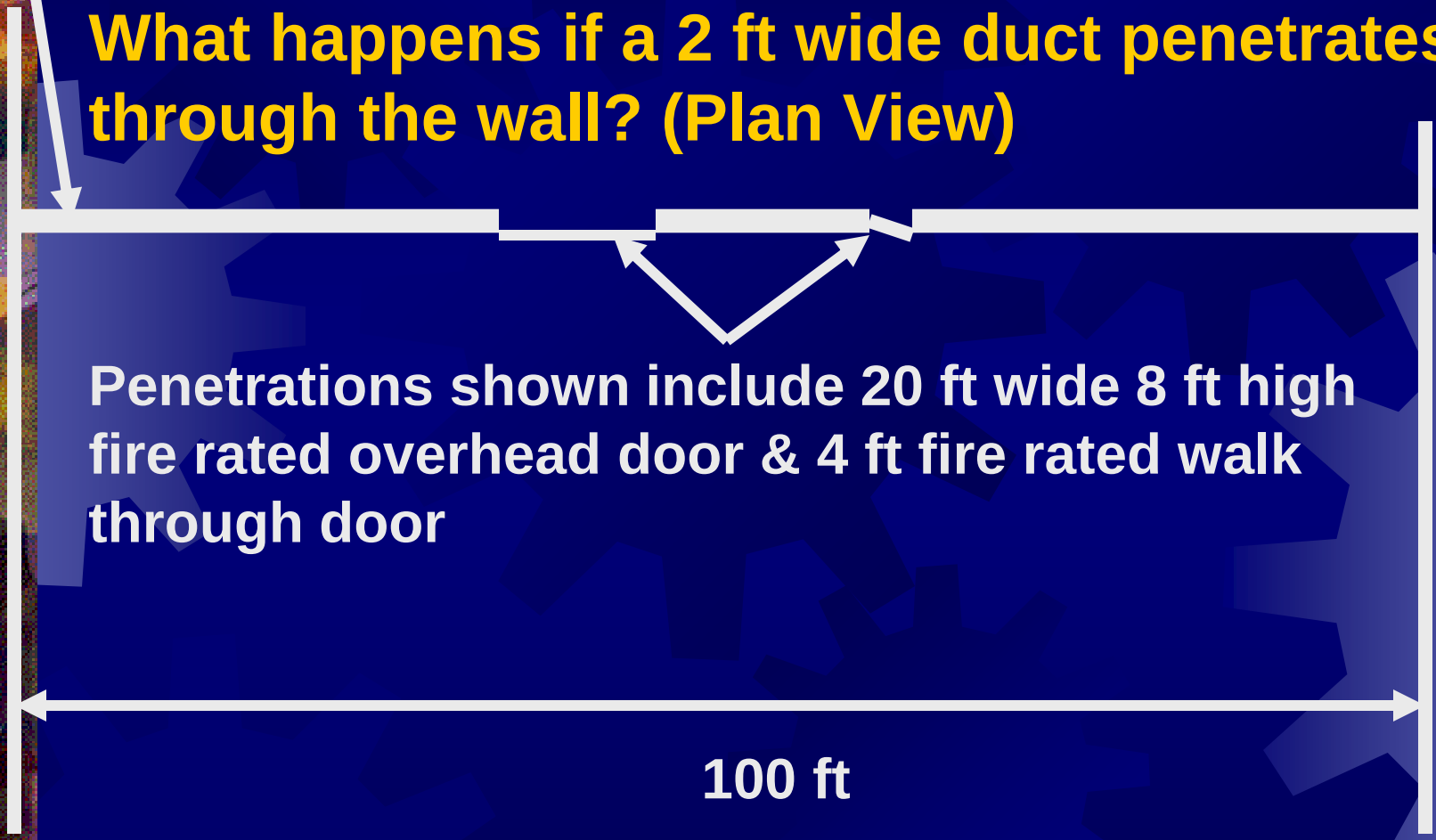


Fire Wall- Fire Dampers

IMC 607.5.1, IBC 706.8, 706.11, 713.1.1 & 716.5.1

- **Ducts may penetrate a <u>Fire Wall (Non-Party Wall)</u> with an appropriate fire damper only if:**
  - No one opening exceeds 156 sf
  - Aggregate width of all openings in the fire wall inclusive of doors, overhead doors, ductwork penetrations, etc is ≤ 25% of the Fire Wall length
  - Exceptions

Is this fire wall design acceptable for this non-sprinklered commercial building? Why? What happens if a 2 ft wide duct penetrates through the wall? (Plan View)



Penetrations shown include 20 ft wide 8 ft high fire rated overhead door & 4 ft fire rated walk through door

100 ft

Fire Barrier

IBC 707

- Fire barrier locations:
  - Shaft Enclosures (IBC 708.4)
  - Exit Enclosures (IBC 1022.1)
  - Exit Passageways (IBC 1023.3)
  - Horizontal Exit (IBC 1025.1)
  - Atriums (IBC 404.6)

Fire Barrier
IBC 707

- Fire barrier locations (Continued):
  - Incidental Accessory Occupancies (IBC 508.2.5)
  - Control Areas (IBC 508.2.5)
  - Separated Occupancies (IBC 508.4)
  - Fire Areas (IBC 707.3.9)
  - Elevator Mechanical Rooms (IBC 3006.4)

Fire Barrier – Continuity

IBC 707.5

- Fire barriers to extend from the top of the foundation or floor/ceiling assy below to the underside of the floor or roof sheathing, slab or deck above and shall be securely attached.
- Must be continuous through concealed spaces, such as the space above a suspended ceiling. (No one floor required for support)

Fire Barrier - Fire Dampers
IBC 707.6

- **Required to be used for door, duct, etc penetrations to Fire Barriers**--(Fire resistance rated vertical assemblies) **if**:
  - No one opening to exceed 156 sf
  - Aggregate width of all openings is ≤ 25% of the Fire Barrier length
  - Exceptions

Fire Barrier - Fire Dampers
IMC 607.5.2

- **Not Required for <u>Fire Barriers:</u>**
  - When penetrations have been tested to ASTM E119 as part of fire rated assembly.

Fire Barrier - Fire Dampers
IMC 607.5.2

- **Not Required for <u>Fire Barriers (cont):</u>**
  - Ducts are used as part of an approved smoke control system per 513 and where the fire damper would interfere with the operation of the smoke control system

Fire Barrier - Fire Dampers
IMC 607.5.2

Not Required for <u>Fire Barriers (cont):</u>

- Walls have <u>≤</u> *1* hr rating, *part of an HVAC system* (ie. return /supply /exhaust), in areas other than *Group H*, are in sprinklered building sprinklered *NFPA 13 & 13R*, & uses sheet steel <u>≥</u> *26 ga* back to appliance.

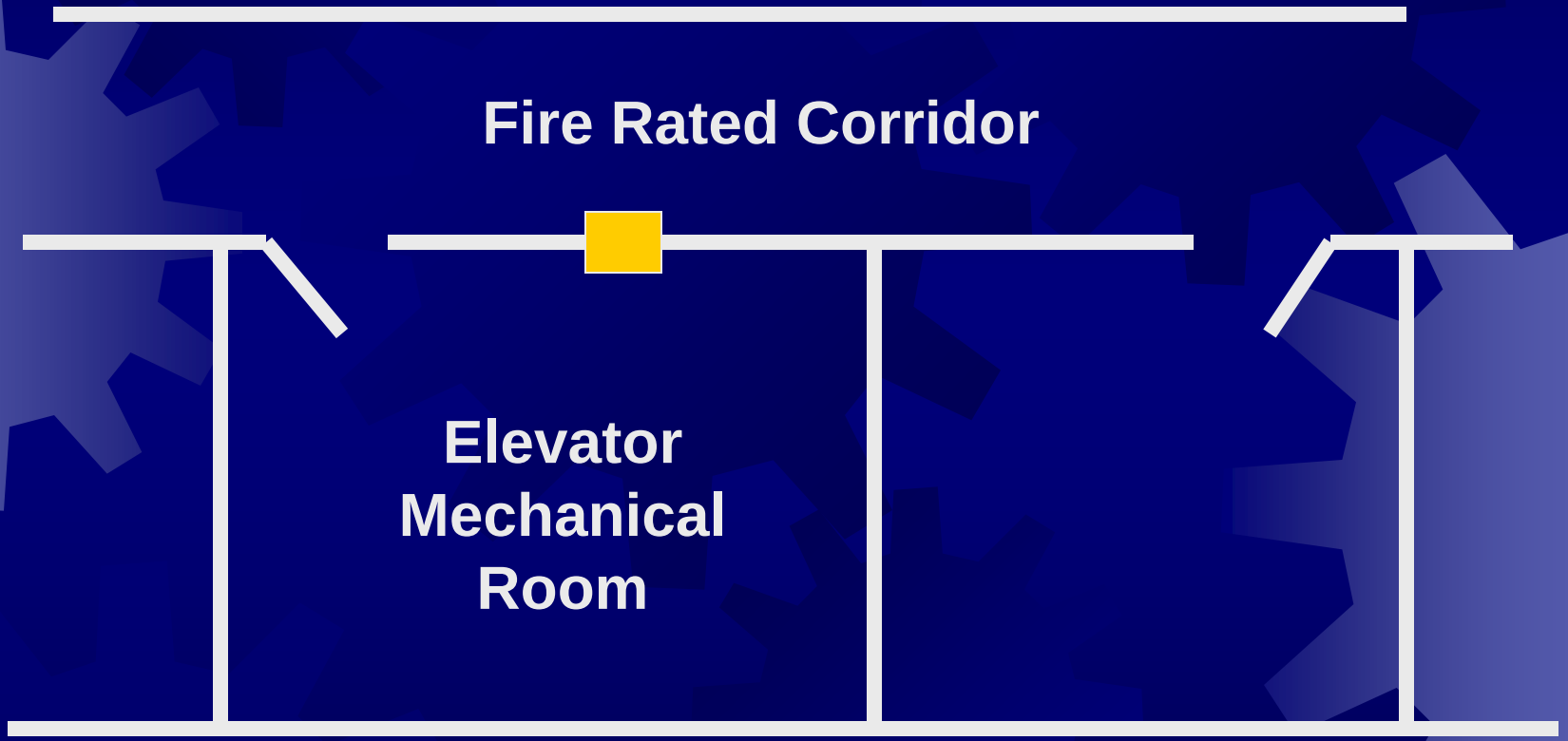
Fire Barrier - Fire Dampers
IMC 607.5.2

- In a fully sprinklered business building, if an air transfer grille is installed in a 1 hr fire barrier assembly for use with an 1 hr rated elevator mechanical room, do I need to have a fire damper installed?

- If air is transferred from a fire rated corridor to this same elevator mechanical room, what else would need to be addressed and why (addressed later)?

Fire Barrier - Fire Dampers

IMC 607.5.2



Fire Partition

IMC 607.5.3, IBC 708.1

- Vertical assembly designed to restrict the spread of fire--May be required with:
  - Walls separating dwelling units
  - Walls separating guestrooms in occupancies in Group R1
  - Walls separating tenant spaces in covered mall bldgs
  - Corridor walls
  - Elevator lobby separation

Fire Partition - Continuity

IBC 709.4

- Fire partitions shall extend from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, slab or deck above or to the fire resistance rated floor/ceiling or roof/ceiling assembly above, and shall be securely attached.

Fire Partition - Continuity

IBC 709.4

- If the partitions are not continuous to the sheathing, deck or slab, and where constructed of combustible construction, the space between the ceiling and the sheathing, deck or slab above shall be fireblocked or draftstopped in accordance with Sections 717.2 and 717.3 at the partition line.

Fire Partition-Fire Dampers
IMC 607.5.3 Exception 1, IBC 708

- **Not Required for <u>Fire Partitions:</u>**
- Corridor walls in bldgs sprinklered per NFPA 13 or 13R & the duct is protected as a through penetration in accordance to *IBC 713.1.1*
  - **<u>Except:</u>** In Group H occupancies

Fire Partition-Fire Dampers
IMC 607.5.3 Exception 2, IBC 708

- **Not req'd for <u>Fire Partitions</u>**
  - The partitions are tenant partitions in covered mall bldgs where the walls are not required by provisions elsewhere in the IBC to extend to the underside of the floor or roof deck above.

Fire Partition-Fire Dampers
IMC 607.5.3 Exception 2, IBC 708

- Note that due to the change in code language, penetrations to fire partitions as located between *residential tenants* must be addressed with fire dampers unless a different listed code exception is met.

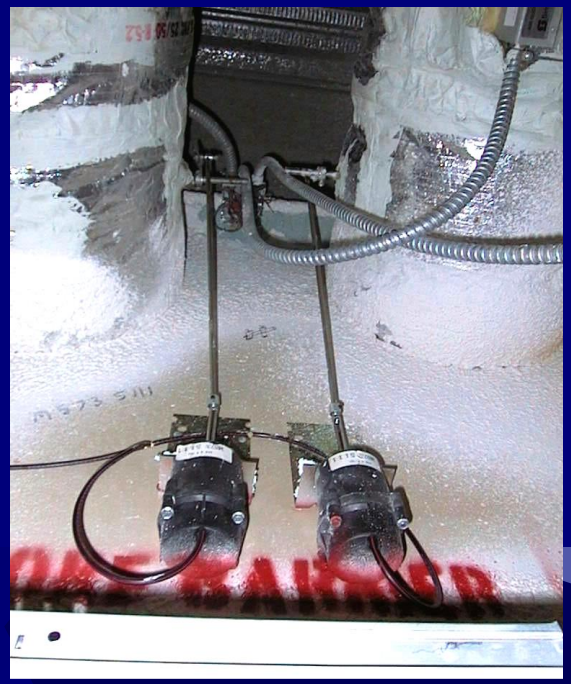
Fire Partition-Fire Dampers
IMC 607.5.3 Exception 3, IBC 708

- **Not req'd for <u>Fire Partitions</u>** when <u>ALL</u> req'ts listed below are met **<u>Except:</u> In Group H occupancies:**
  - Duct $\leq$ 100 in^2 in cross section (< 11" diam)
  - Duct Metal $\geq$ 0.0217" thickness **(24 ga steel)**
  - Duct may not have openings to corridor with adjacent spaces or rooms
  - Duct must be located above a ceiling
  - Duct may not terminate at a wall register in a fire rated wall
  - 12" long sleeve w/ 15 ga metal to be installed et al.

Fire Partition/Smoke Barrier – Smoke Dampers

IMC 607.5.4.1, IBC 716.5.4.1 & 716.5.5

- Req'd at each point that a duct or air transfer opening penetrates a **rated corridor enclosure** or **smoke barrier** required to have draft doors by IBC 716.5.4.1 & 716.5.5



Fire Partition-Smoke Dampers

IMC 607.5.4.1, IBC 716.5.4.1

- **Exceptions:**
  - When a smoke control system per IBC 909 is used, and they are not necessary for operation
  - When openings in ducts are limited to a single smoke compartment & are constructed of steel
  - Corridors where the duct is constructed of steel ≥ 0.019 (25 ga) ***& no openings serve the corridor***

Fire Partition-Smoke Dampers

IMC 607.5.4.1, IBC 716.5.4.1

Immaterial if it is a supply, return or exhaust duct, NO SMOKE DAMPER is required if the duct system does NOT serve the fire rated corridor

Fire Rated Shafts

IBC 708.1

- A shaft enclosure is required for openings through a floor/ceiling assembly unless an exception is met.
- Shaft enclosures shall be constructed as fire barriers or horizontal assemblies or both.

Fire Rated Shafts

IBC 708.4

- Shaft enclosures to be not less than:
  - 2 hrs where connecting > 3 stories
  - 1 hr where connecting ≤ 3 stories
- Shaft enclosures shall have a fire resistance rating not less than the floor assembly penetrated, but need not exceed 2 hrs.

Shaft-Fire *& Smoke* Dampers **IMC 202, 607.5.5, IBC 707**

- **Required for Shaft Enclosures**
  - The walls or construction forming the boundaries of a shaft
  - Definition of a shaft:
    - An enclosed space extending through one or more stories of a building, connecting vertical openings in successive floors, or floors & roof.

Shaft-Fire & Smoke Dampers IMC 607.5.5, IBC 716.5.3 Exception 1.1

- **Fire Dampers Not Req'd in a Shaft Enclosure if:**
  - Steel subducts extend min. 22" vertical in exhaust shaft
  - Provided there is continuous airflow upward to the outside
    - **(Refer to IMC 603.4 for minimum gauge of metal ductwork)**

Shaft-Fire & Smoke Dampers
IMC 607.5.5 Exception 2, IBC 702

- **Smoke Dampers Not Req'd in a Shaft Enclosure**
  - In **"B" OR "R"** occupancies,
    - **sprinklered per NFPA 13,**
    - **min. 0.019" (25 ga) metal subducts that extend min. 22" vertical in exhaust shaft**
    - **with exhausts fan powered continuously per IBC 909.11, and airflow upward to the outside**

2 Power sources….

Shaft-Fire & Smoke Dampers

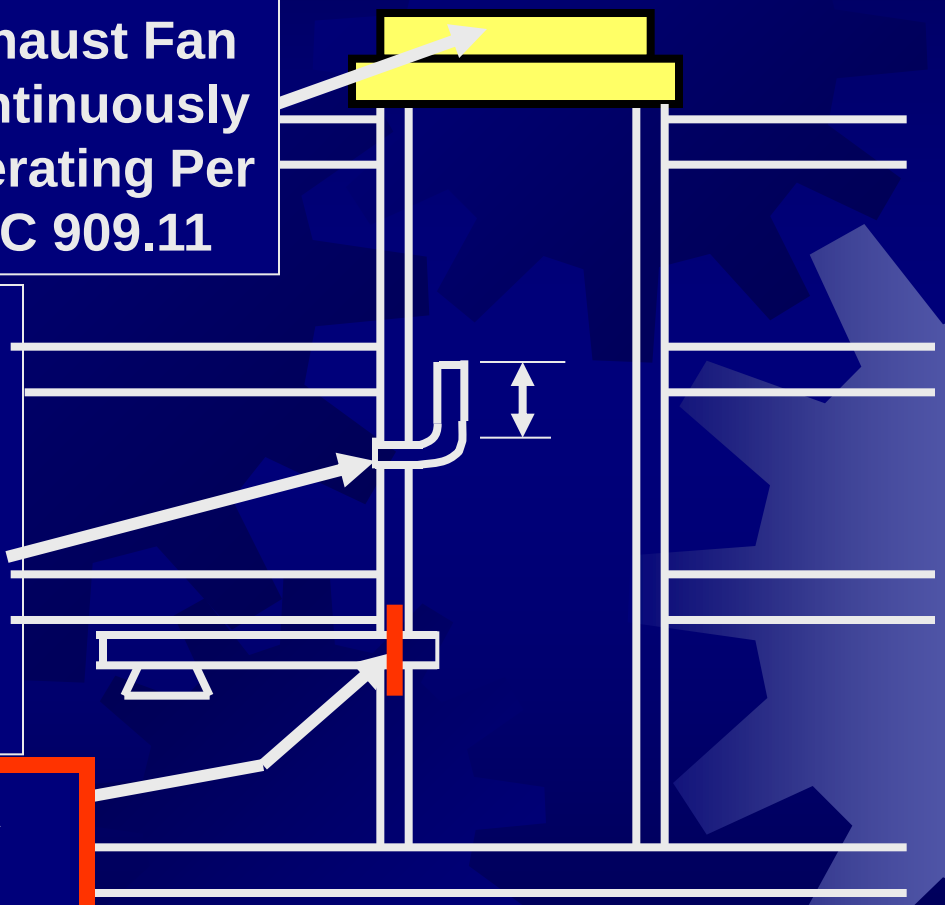
IMC 607.5.5 Exception 1.1 & 2

Fire Rated Shaft

Exhaust Fan Continuously Operating Per IBC 909.11

"B" or "R" OCCUPANCY, NFPA 13, SUBDUCT WITH MIN. 22" EXTENSION & 0.019" METAL- ***NO FIRE OR SMOKE DAMPER REQ'D***

FIRE & SMOKE DAMPER REQ'D AT SHAFT WALL



Shaft-Fire & Smoke Dampers

IMC 607.5.5 Exception 1.2

- **Fire Dampers Not Req'd in a <u>Shaft Enclosure</u>** if:
  - Penetrations are tested per ASTM E119 as part of fire rated assembly

Shaft-Fire & Smoke Dampers SPS 364.0607(1)

- **Smoke Dampers Not Req'd in a <u>Shaft Enclosure</u>**
  - In exhaust portion of systems which are designed and installed in accordance with NFPA 45 (Standard on Fire Protection for Laboratories Using Chemicals-- ie. Fume/Chemical Hoods)

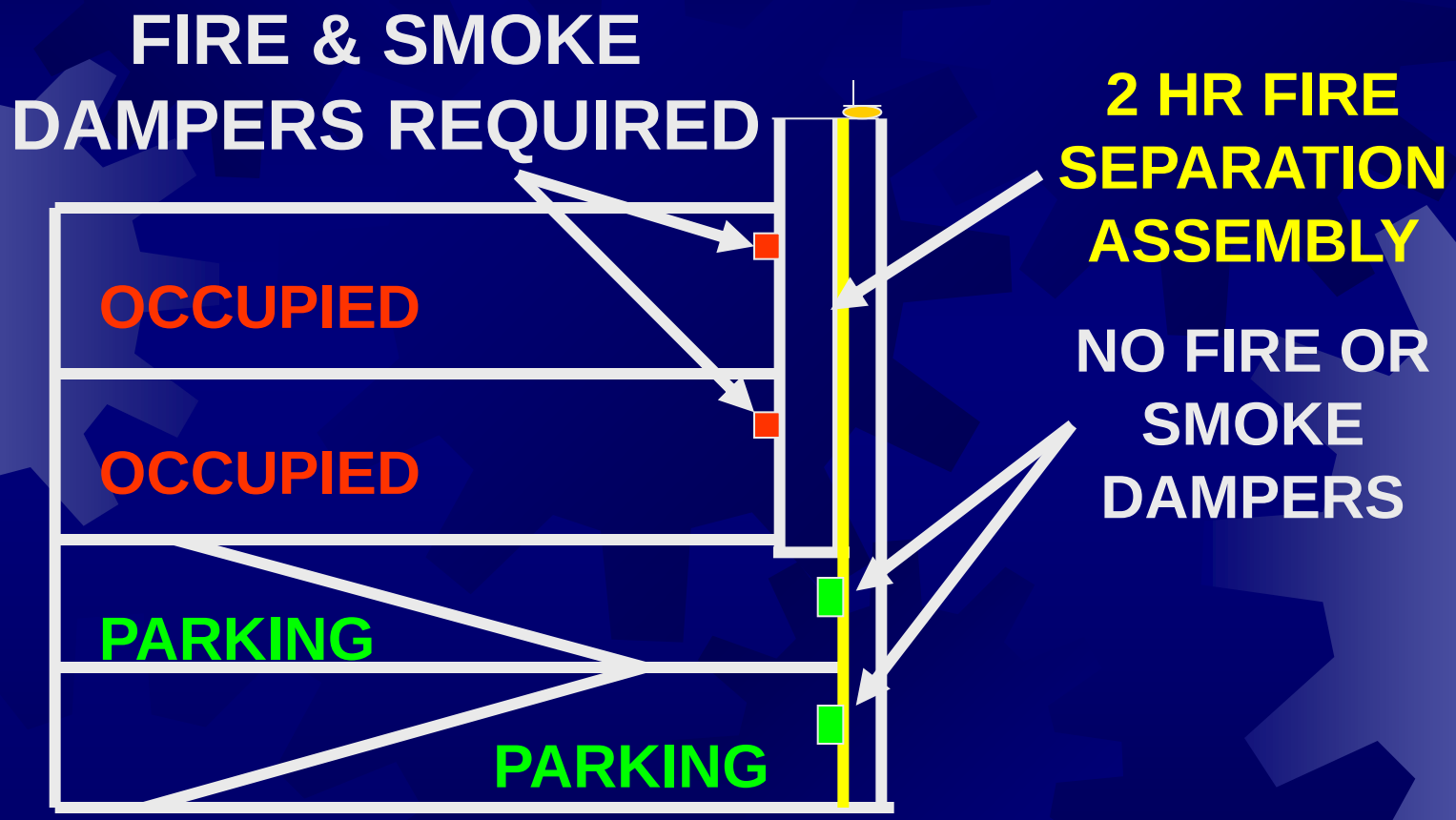
Shaft-Fire & Smoke Dampers

IMC 607.5.5 Exceptions 3 & 4, IBC 702

- **Shaft Enclosure** Fire & Smoke Damper--Exceptions (Continued)
  - Ducts are part of smoke control system per IBC 909
  - Penetrations in parking garage exhaust or supply shafts that are separated from other building shafts by ≥ 2 hr fire resistance construction

Shaft-Fire & Smoke Dampers

IMC 607.5.5 Exceptions, IBC 702



Shaft-Fire & Smoke Dampers

IMC 607.5.5.1, 607.5.6

- Shaft enclosures that do not extend to the bottom of the bldg or structure to be protected as required by IBC 708.11
- Ducts & air transfer openings in fire resistance rated exterior walls to be protected as required by IBC 705.10

Shaft-Smoke Dampers

IMC 607.5.7

- **Smoke Partitions**
  - A listed smoke damper designed to resist the passage of smoke shall be provided at each point where an air transfer opening penetrates a smoke partition.
    - Exception: Where the smoke damper will interfere with the operation of a smoke control system

Shaft-Fire Dampers
IMC 607.6.1

- **Shaft Enclosure** Rated Fire Damper and Shaft--Exceptions (Cont.)
  - Duct and transfer air systems that penetrate a fire rated floor ceiling assembly & connects not more than 2 stories is permitted without shaft enclosure protection provided a fire damper is installed at the floor line

Shaft-Fire & Smoke Dampers

IMC 607.5.5, 607.6.1, IBC 702

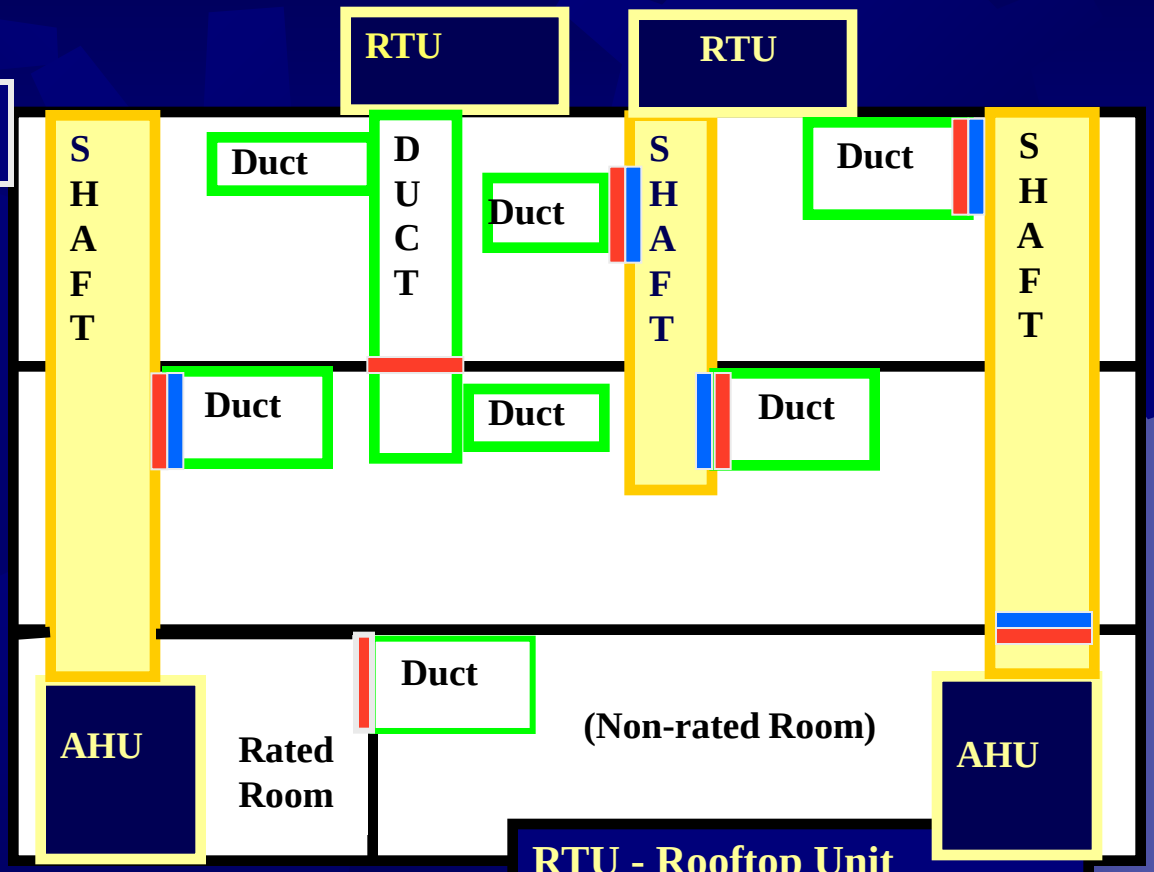
Fire Dampers

Third Story

General locations with exceptions

Second Story

First Story



RTU - Rooftop Unit
FD - Fire Damper
Shaft - Fire-rated shaft
AHU - Air Handling Unit

Fire Damper
Smoke Damper

Shaft-Fire Dampers
IMC 607.6.1 Exception 1

- Ducts in Group R Occupancies (hotels, motels, apartments, townhouses, condominiums, etc.) may penetrate 3 fire rated floors or less **Without a Shaft & Without Fire Dampers** *when ALL five (5) requirements* in the code are met:

Shaft-Fire & Smoke Dampers
IMC 607.6.1 Exception 1

- Steel Duct in wall cavity w/min. 0.019” (26 ga) thickness
- Duct open to ONLY 1 dwelling/sleeping unit & is continuous to the exterior
- Duct is ≤ 4” diam, with penetrations ≤ 100 sq.in. for any 100 sf of floor area
- Annular space is protected
- Ceiling Membrane Protections (Radiation Dampers) per IBC 716.6.2.1 used

Horizontal Assemblies
IBC 712

- Fire-resistance rating of floor & roof assemblies to be addressed:
  - Not to be less than the bldg type of construction
  - For mixed occupancies, not to be less than that required by IBC 508.4 based on the occupancies separated.
  - Where a single occupancy is separated into different fire areas, not to be less than that required by IBC 707.3.9.

Horizontal Assemblies

IBC 712

- Fire-resistance rating of floor & roof assemblies to be addressed:
  - When separating dwelling units or sleeping units in the same building, to be a minimum 1 hr fire resistance rated construction
    - Exception: Dwelling unit & sleeping unit separations in Bldgs of IIB, IIIB and VB construction to have a min. ½ hr fire resistance in bldgs w/NFPA 13 sprinkler system

Radiation Dampers for Membrane Penetrations

IMC 607.6.2, IBC 716.6.2

- Where duct systems constructed of approved materials in accordance with the IMC penetrate a ceiling of a fire rated floor/ceiling or roof/ceiling assembly,
- Shaft enclosure protection is **NOT** required provided an approved ceiling radiation damper is installed at the ceiling line

Radiation Dampers for Membrane Penetrations IMC 607.6.2.1

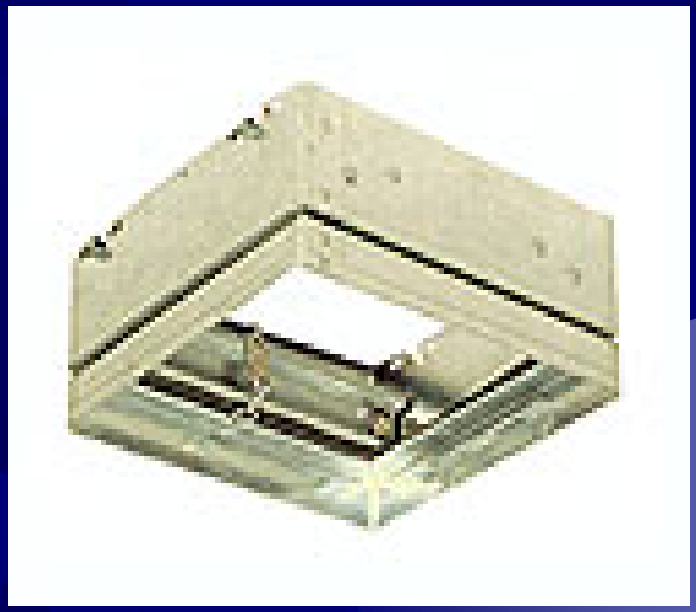
- **What is a Ceiling Radiation Damper**?
  - Similar to a fire damper, but used in a fire rated floor ceiling or roof ceiling assembly used to impede the migration of high temperatures into and through a duct system.
  - A device installed in the throat of ceiling diffuser or return air grille.

Ceiling Radiation Damper Example

Ceiling Radiation Damper Example

Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.6.2



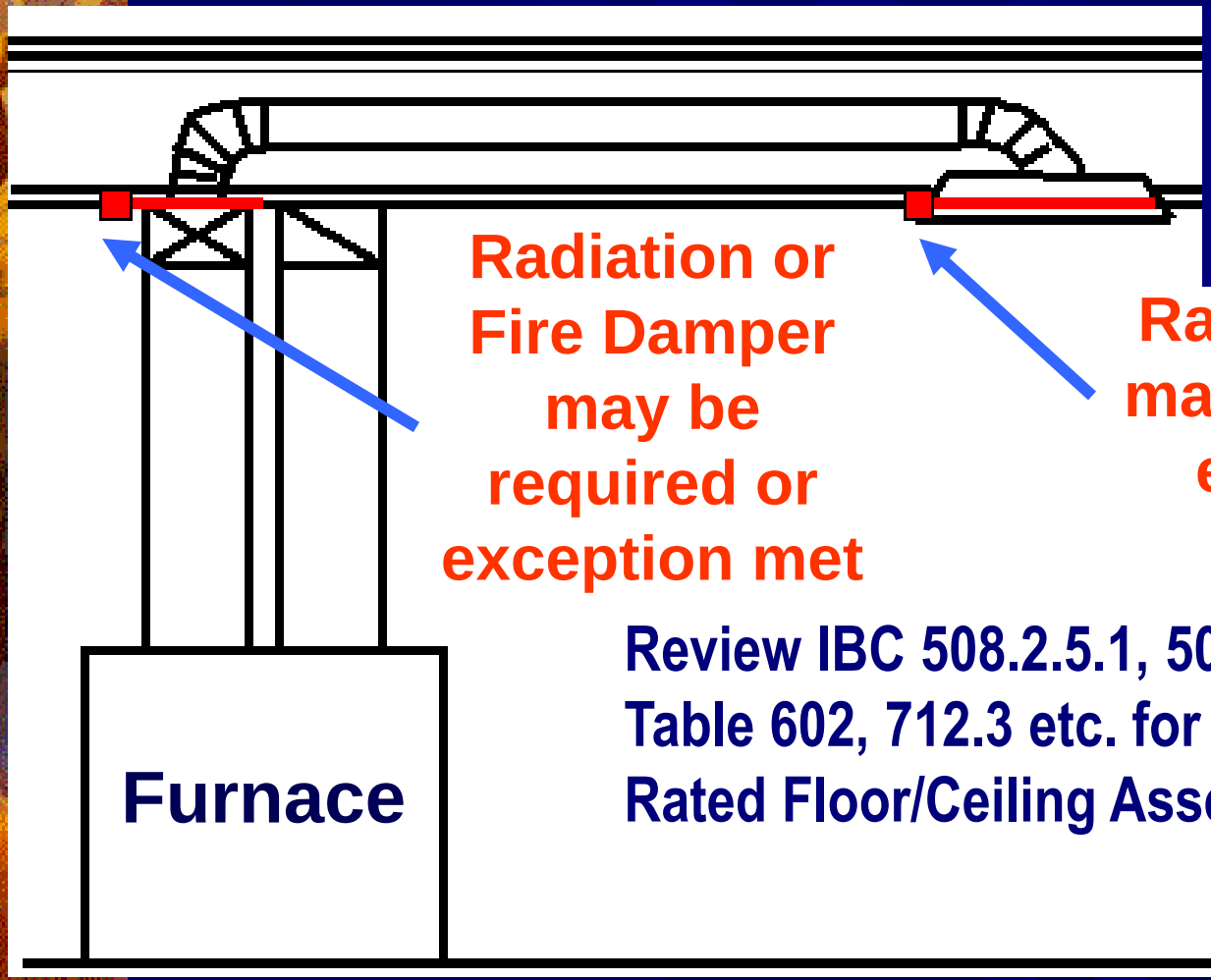
Exhaust fan with ceiling radiation damper accessory

Radiation Dampers for Membrane Penetrations IMC 607.3, 607.6.2

- Ceiling Radiation Dampers to meet UL 555C
- Ceiling Radiation Dampers **NOT** required where ASTM E 119 fire test have shown that ceiling radiation dampers are not necessary in order to maintain fire resistance rating of the assembly

Ceiling Radiation Dampers for Membrane Penetrations

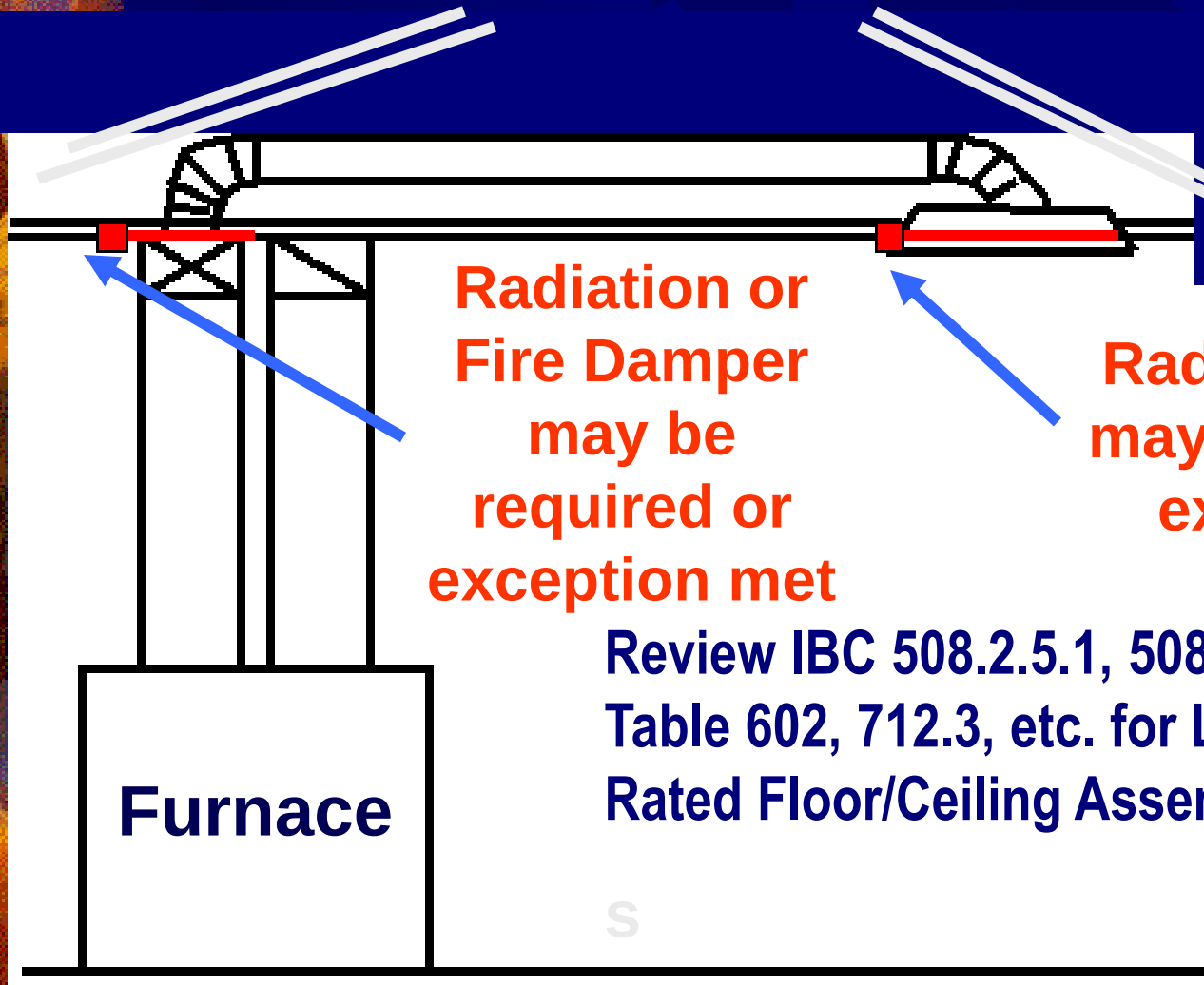
IMC 607.6.2.1



Review IBC 508.2.5.1, 508.3.3, Table 601, Table 602, 712.3 etc. for Locations of Fire Rated Floor/Ceiling Assemblies

Ceiling Radiation Dampers for Membrane Penetrations

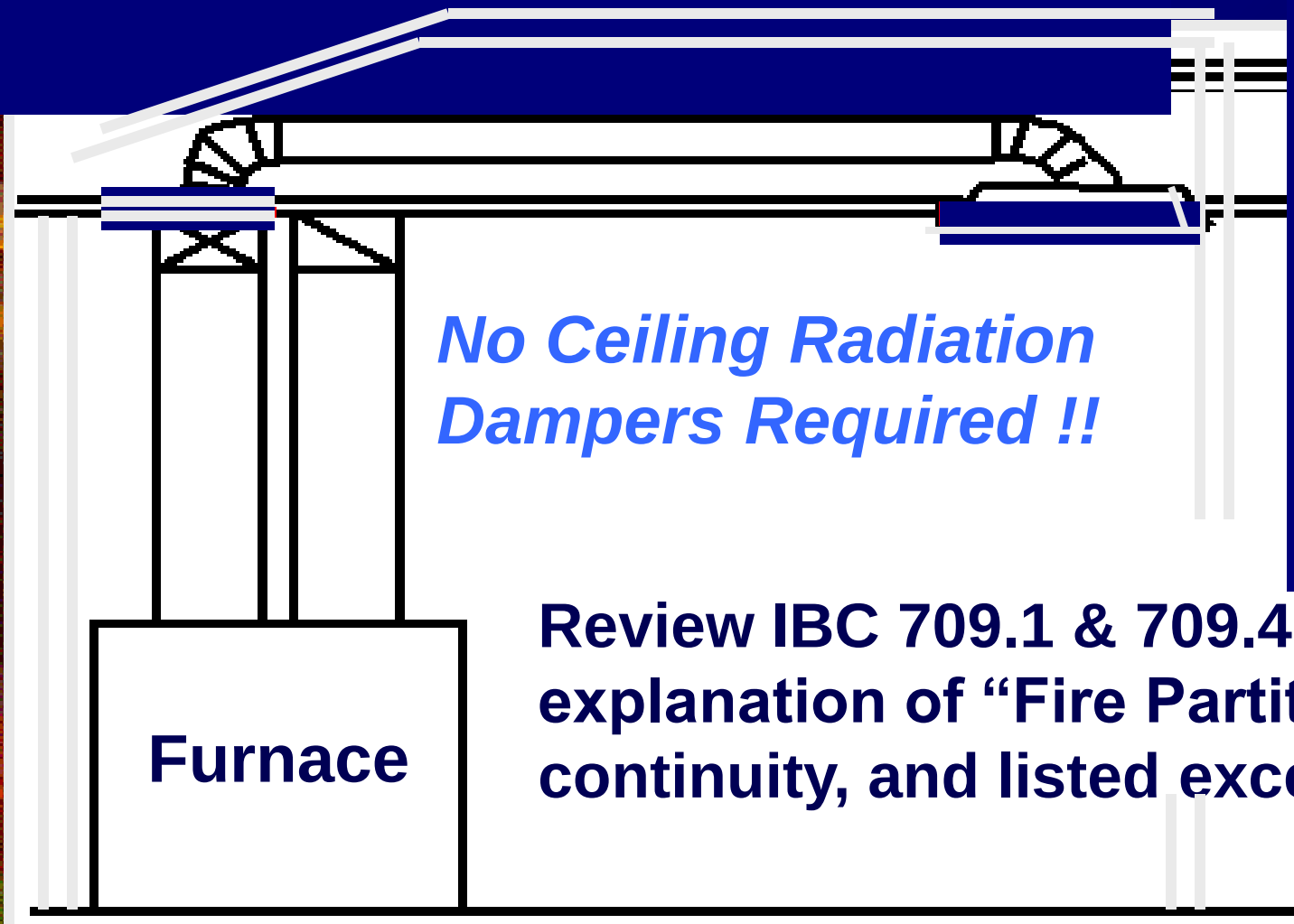
IMC 607.6.2.1



Review IBC 508.2.5.1, 508.3.3, Table 601, Table 602, 712.3, etc. for Locations of Fire Rated Floor/Ceiling Assemblies

Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.6.2.1



No Ceiling Radiation Dampers Required !!

Apt. with *Non-Fire Rated* Roof/Ceiling Assy WITH separation per IBC 708.4 to the roof deck

Review IBC 709.1 & 709.4 for explanation of "Fire Partitions", continuity, and listed exceptions

Radiation Dampers for Membrane Penetrations

IMC 607.3, 607.6.2.1

- **Not Required** for Fire rated Floor/Ceiling or Ceiling/Roof Assys when:
  - **Exhaust** duct penetrations are protected per *IBC 713.4.1.2* & the exhaust ducts are located within the cavity wall (includes floor/ceiling), and **do NOT pass through another dwelling unit or tenant space**

Question

- From Dept. Q&A:
  - **"….In the context of the code, the exhaust system and some or all of the associated ductwork are often located within the ceiling cavity. The reference to the 'wall cavity' emphasizes the condition that the duct system for the exhaust system may not pass through the space of another dwelling or tenant. Ductwork within the cavities of horizontal or vertical assemblies separating dwelling units and tenant spaces are not considered to be 'passing through' the space of another dwelling or tenant." 7/11/08**

Radiation Dampers for Membrane Penetrations

IMC 607.3, 607.6.2.1

- From Dept. Q&A:
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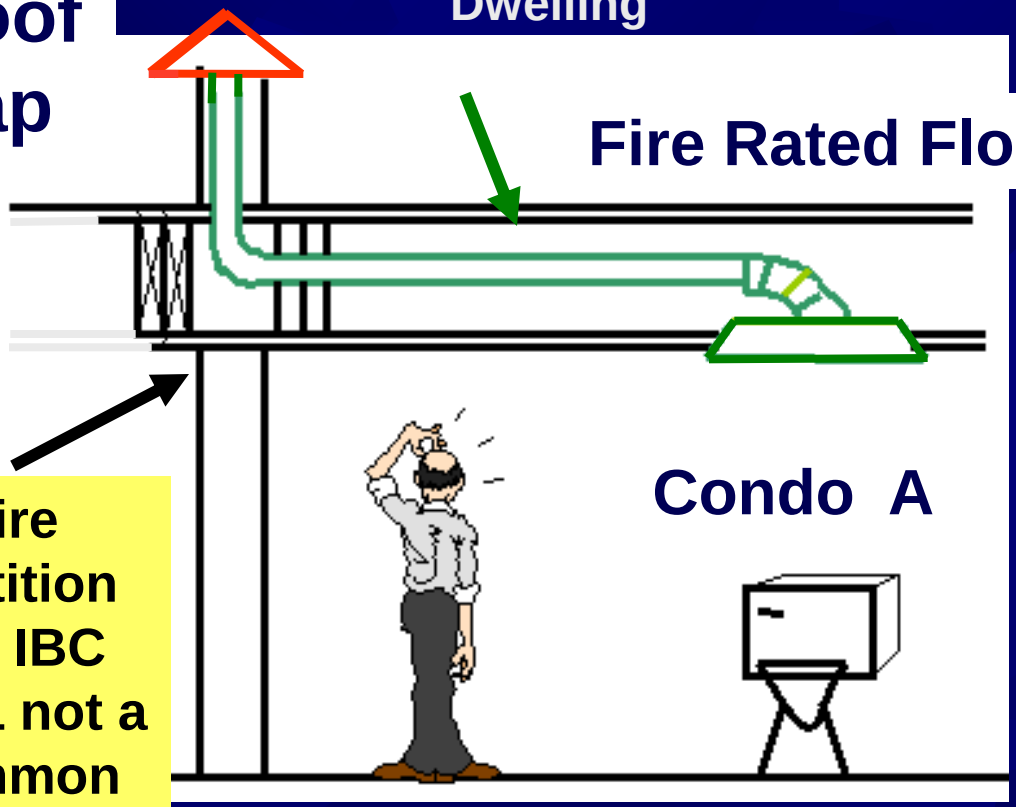
Radiation Dampers for Membrane Penetrations

IMC 607.6.2.1 Exception 2

Exhaust Fan & Ductwork Serving Single Dwelling

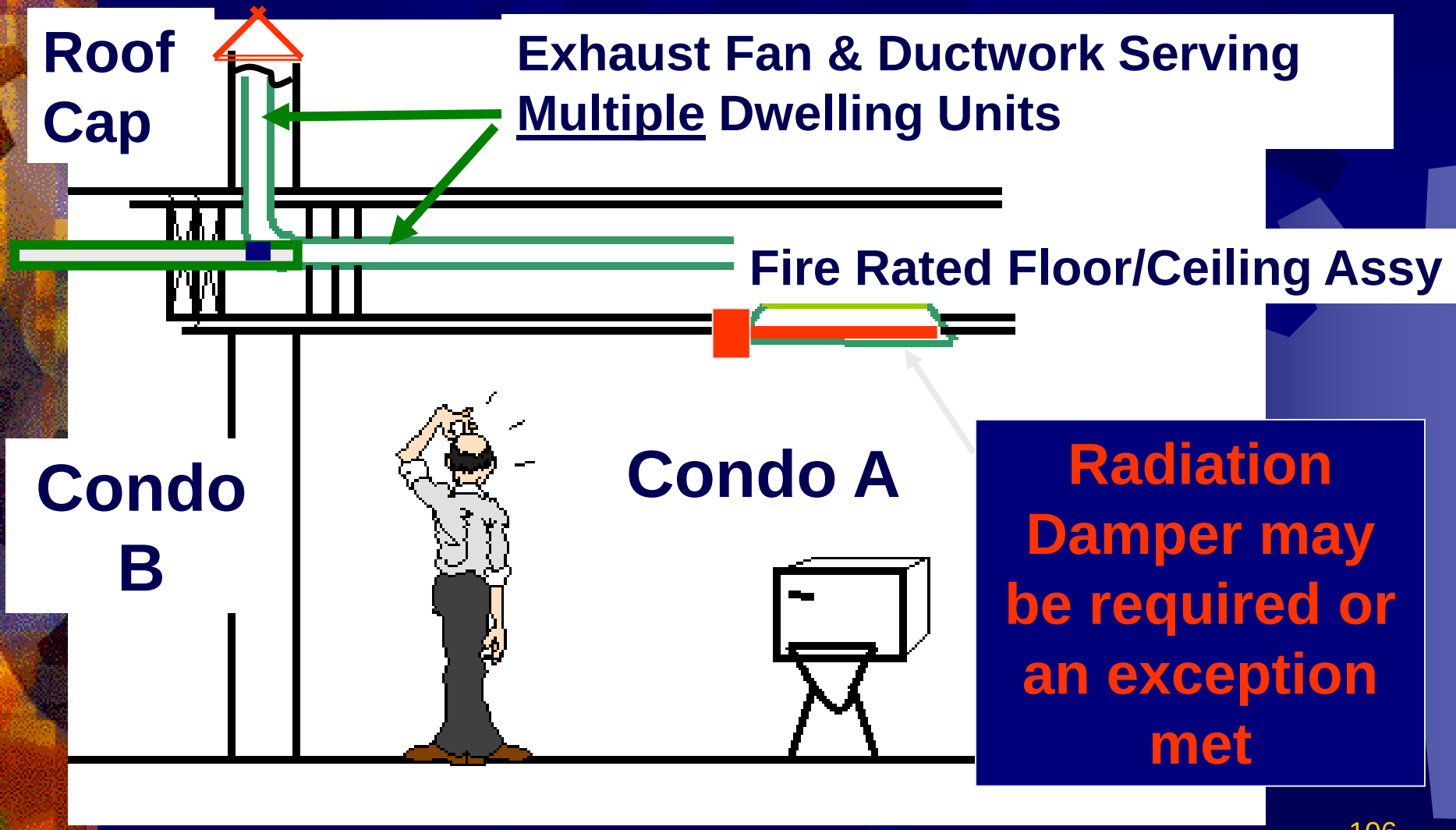
Roof Cap



Fire Partition Per IBC 709.1 not a common wall

NO Radiation Damper required if annular space filled

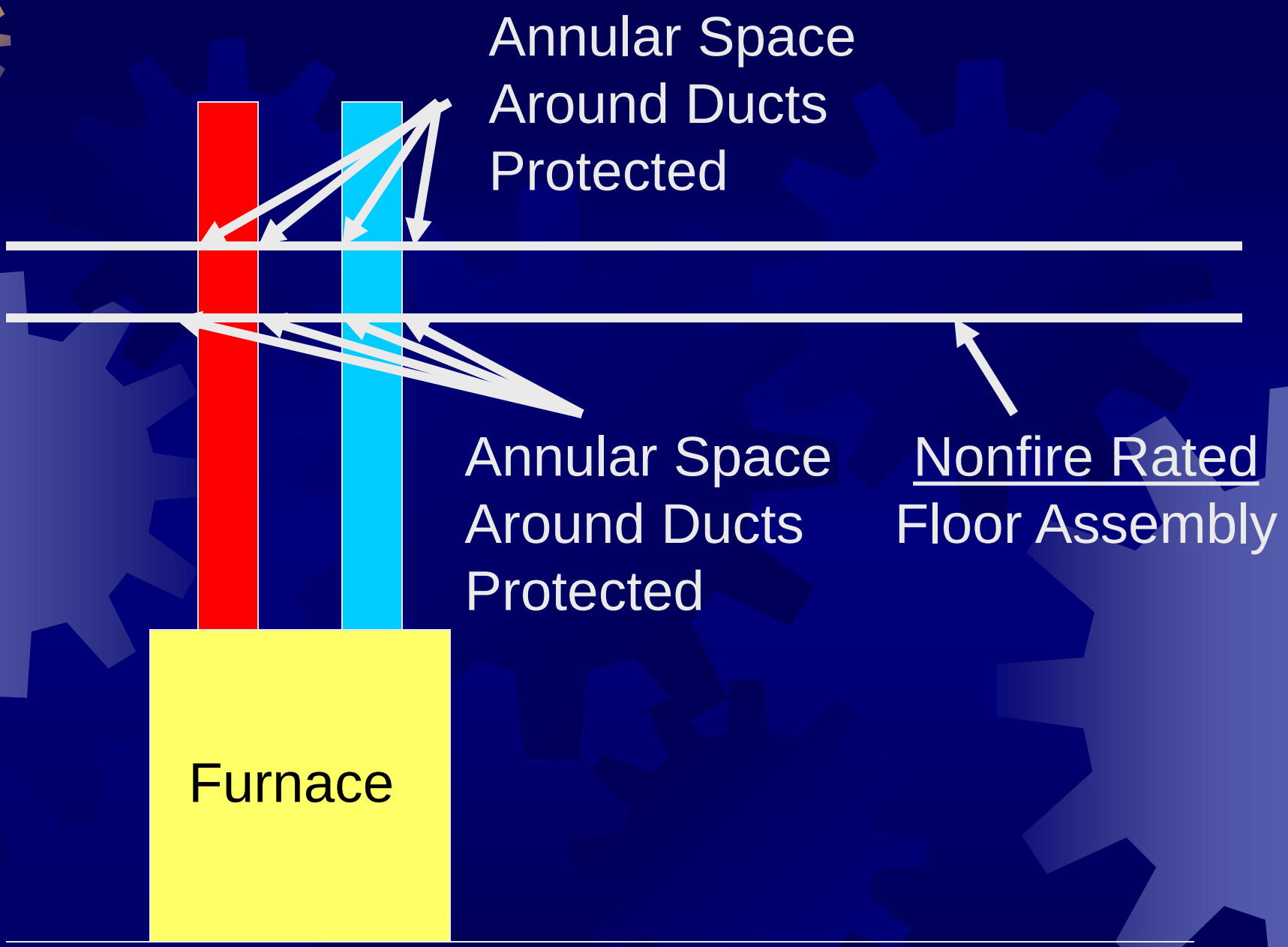
Radiation Dampers for Membrane Penetrations IMC 607.6.2.1



Nonfire Rated Floor Assemblies

IBC 716.6.3

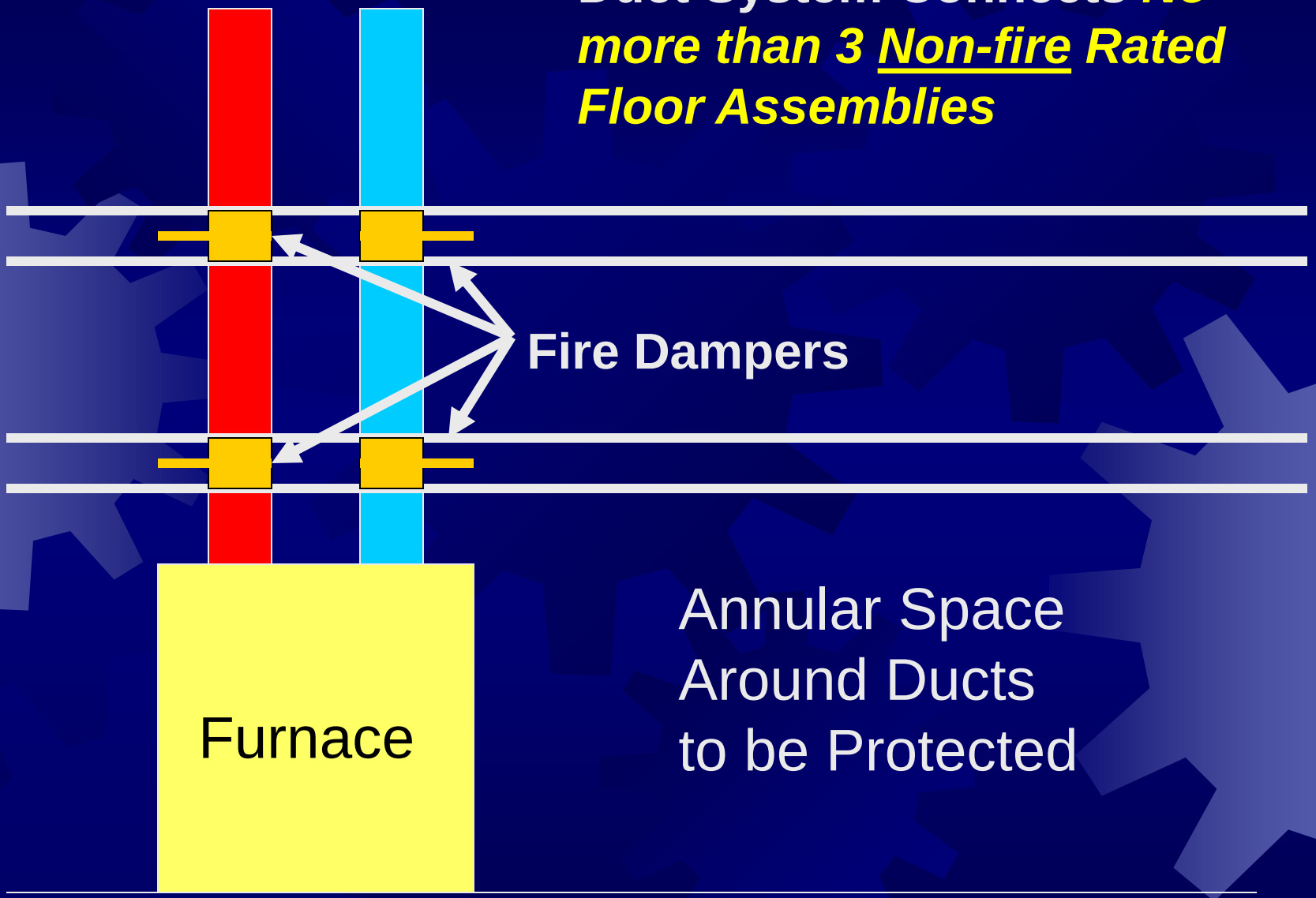
- Acceptable:
  - Ducts that penetrate *not more than 2 stories & the annular space around the penetrating duct is protected* with an approved noncombustible material that resists the free passage of flame and the products of combustion


Annular Space
Around Ducts
Protected
Annular Space
Around Ducts
Protected
Nonfire Rated
Floor Assembly
Furnace

Non-Fire Resistance Rated Floor Assemblies IBC 716.6.3

- Acceptable:
  - The *duct connects not more than 3 stories*, and the annular space around the penetrating *duct is protected* with an approved noncombustible material that resists the free passage of flame and the products of combustion and *a fire damper is installed at each floor line.*
    - Exception: Fire dampers are not required in ducts within individual residential dwelling units.

Duct System Connects *No more than 3 Non-fire Rated Floor Assemblies*

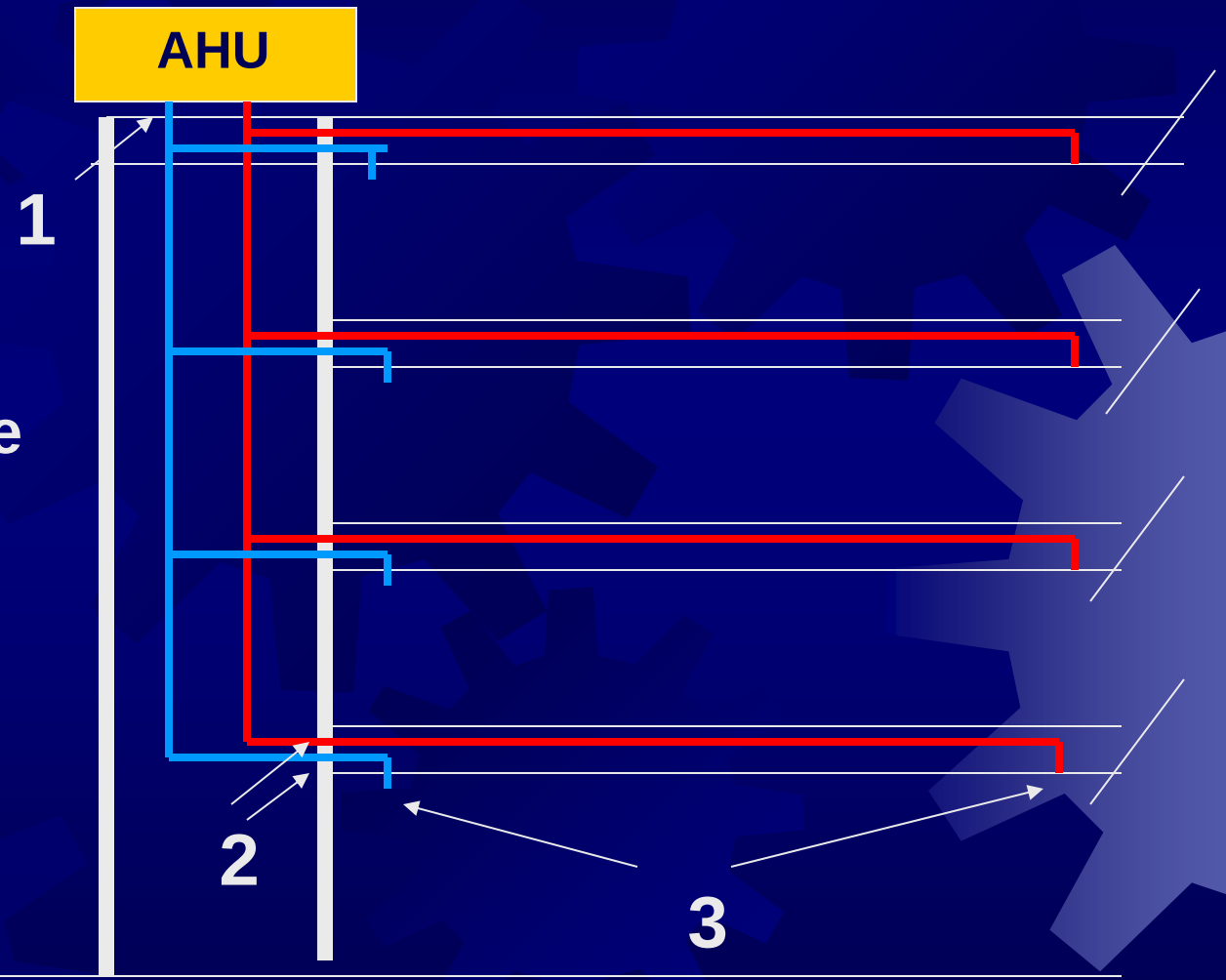


Annular Space Around Ducts to be Protected

Where are fire, smoke or ceiling radiation dampers required?

Sprinklered VA Bldg with B occupancy

- Minimum Fire Rating of Shaft?
- Minimum Fire Damper Rating?
- Is a Fire or Smoke Damper Required? If so, where?
- Is a Radiation Damper Required? If so, where?



Elevator Machine Room Venting
IMC 607.5.2, 607.5.3, 607.5.4, IBC 3006.4

Are the walls req'd to be rated? If so, what is the minimum fire rating, and the fire assy?

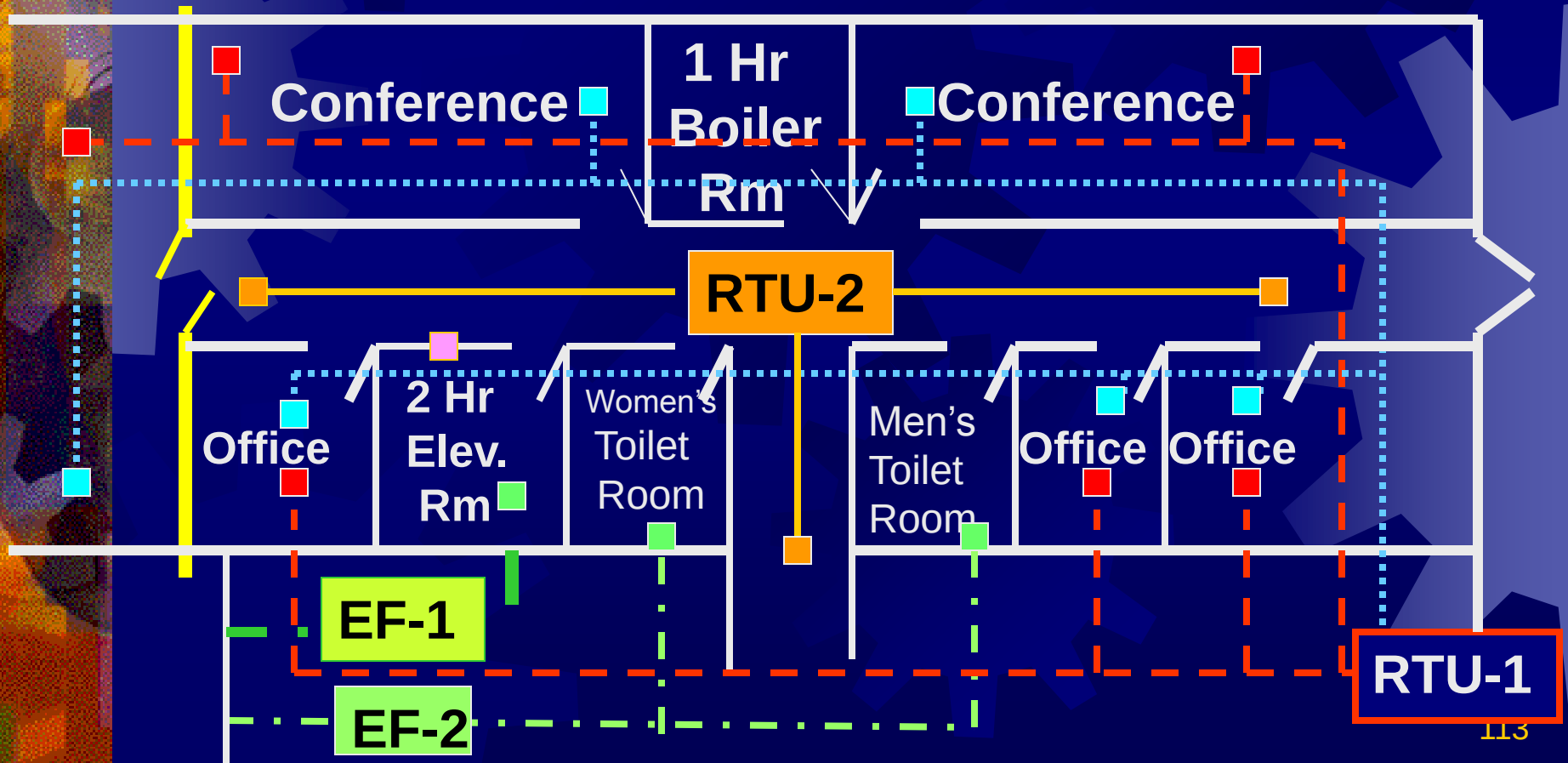
Are fire or smoke dampers or both required?

What can be done to avoid the need for dampers?

Where are doors, fire, smoke or ceiling radiation dampers required?

Fire Rated Corridor Layout

IIIB Nonsprinklered Bldg, *3 hr Fire Wall,* Assume Exposed Ductwork (Except for Elevator Room), 2 hr Elevator Mechanical Room; 1 hr Boiler Room



General Code Information

- You may purchase copies of the 2009 ICC codes adopted by SPS 361.05, by way of glued bound books, three ring binders, or electronic copies at the following web site:
- http://shop.iccsafe.org/codes/2009-international-codes.html

General Code Information

- There are PDF files online for downloading & printing SPS 362-366 code sections to insert into 3-ring binder loose-leaf formats of the Wisconsin-adopted ICC model codes, http://dsps.wi.gov/Programs/Industry-Services/Industry-Services-Programs/Commercial-Buildings/Commercial-Buildings-Publications/

General Code Information

- You may view the 2009 ICC codes on-line for free @:
- http://publicecodes.cyberregs.com/icod/index.htm

General Code Information

- You may view the WI amendments in their entirety to the various 2009 ICC codes adopted by SPS 361.05 electronically on the internet at:
- http://dsps.wi.gov/Programs/Industry-Services/Industry-Services-Programs/Commercial-Buildings/Commercial-Buildings-Admin-Code/

General Information

- To get on the Industry Services Email list for updates on interpretations on the commercial building code, as well as the boiler, refrigeration, electrical, plumbing, etc. codes, please go to:
- http://dsps.wi.gov/Online-Services/Industry-Services/

Questions?

Thanks for Listening!